

## REMARKS

In the office action, the examiner issued a series of restriction requirements. First, the examiner requires Applicants to elect between the method claims (1-16, 19, 20) on the one hand, and the apparatus claims (17, 18) on the other. Applicants herein elect the method claims (1-16, 19, 20); however, Applicants wish to traverse this restriction requirement and present the following arguments.

The examiner contends that the apparatus as claimed can be used to practice another and materially different process, in particular functioning as an air gun in a seismic survey. (Presumably one would disable pump 5 or fill chemical additive tank 7 with water? Reference is to Fig. 1 of the present application.) An air gun is (1) a high-pressure device operating typically at 2000 to 2500 psi or more above atmospheric pressure that is (2) used in an impulsive mode whereby a significant portion of a trapped air volume is emitted within a few milliseconds by an opened shuttle/window in the air chamber. The injection of this short duration, high pressure air volume (3) emits a single, very large bubble feet or meters in diameter. See, for example, the attached two pages from the website of the U.S. Geological Survey, including also a marked up copy of the cutaway view to make it clearer what is being depicted. This air gun has four exit ports where a large volume of air is ejected at very high pressure each time the gun is "fired." See also U.S. Patent No. 4,472,794 (see col. 2, lines 52-54 describing a prior art air gun design operating at firing chamber pressures in the range 3,000 to 5,000 psi), or visit the website of Bolt Technology, Inc., a leading manufacturer of air guns: [http://www.bolt-technology.com/Marine\\_Air%20Guns\\_Title\\_Page.htm](http://www.bolt-technology.com/Marine_Air%20Guns_Title_Page.htm). A copy of Bolt's website page is enclosed herein. The rating of the various air gun models in terms of cubic inches refers to the volume of the air gun's chamber, where air is pressurized before "firing." None of the photographs or drawings show exact dimensions of the ports, but clearly they are not the "micropores located at intervals along hose 1" as described in paragraph 29 of the present application in conjunction with Fig. 1, openings too small and numerous to be shown in Fig. 1. Applicants have amended claim 1 to more precisely reflect this feature of the present invention, so different

from an air gun. A myriad of tiny bubbles continuously fizzing from the pores of a flexible hose as compared to a huge single bubble blasted out of the 2-4 ports of a high-pressure device made of steel each time the air gun is fired.

Claim 17 has been further amended herein to limit its diffuser to a hose made from polymeric or elastomeric material (as in original claim 6). Such a diffuser would not be able to withstand the pressures required for air gun seismic operations, which extend up into the thousands of psi as noted above. In fact, the present device has no means to contain the pressure while the pressure builds up for a single impulsive blast needed for seismic work. An actual air gun has a valve that seals the air chamber during pressure buildup. The present device has no such valve and in fact has no suitable air chamber. To be used as an air gun, the "Y" conduit (see ¶ 30) would need to serve as the air chamber. It would have to be pressurized by a compressed air source 13, and as the pressure builds up, the walls of the "Y" conduit would have to be able to withstand the pressure, including the plug 9 suggested as being epoxied to that end of the "Y." Furthermore, a valve would have to be retro-fitted to seal off the diffuser hose 1 from the rest of the "y" conduit serving as the pressure buildup chamber. (Reference is to Fig. 1 of the present application.) Hence, the present device is not capable of acting in the short duration, pulsed mode required for seismic prospecting. If a valve were retro-fitted to the present device, it would still be able to emit only a very small impulsive acoustic signal because the claimed diffuser would have a burst pressure on the order of about 100 psi, which is far too low in energy to be of use as a seismic source. Air guns need to be capable of repeated firing without replacing an exploded part after each shot. Even if the diffuser was capable of containing high pressure air, the total flow rate for the diffuser would not allow sufficient energy to be transferred to the water to create a seismic air gun signature.

To further respectfully refute this theory of the examiner's that the device of Fig. 1 is suitable for dual use as a seismic air gun, Applicants submit herewith the expert affidavit of Michael Norris.

The examiner next required (item 4 in the office action) the first of several required elections of species, pointing out that there is no generic claim. Applicants elect the following species as stated by the examiner:

- A. Coating the diffuser before use with a chemical additive.

However, Applicants herein amend claim 1 to be a generic claim which Applicants believe is allowable, rendering the above-stated species election moot. All embodiments (including all “species”) of the present inventive method involve using a chemical additive to increase the rise time of air bubbles (smaller bubbles rise more slowly) emitted from a diffuser in water for the purpose of suppressing noise in a marine seismic survey, which is considered to be a sufficiently narrow scope of subject matter to allow a single, efficient search of the published literature for the four claimed species identified in item 4 of the office action. In the amended claim set, there is only one independent method claim, the generic claim. All independent species claims have been cancelled (except claim 1, which is rewritten as the generic claim). The reduction from four independent method claims to one accounts for all substantive amendments to the dependent claims. Regarding the form of amended claim 1, Applicants cite *Landis on Mechanics of Claim Drafting*, Fifth Ed., § 6:2, “Thus, *Markush* language is used to create an artificial generic expression.”

Amended claim 1 is also expressly generic with respect to the features that the examiner identifies as species in item 5 of the office action. Although amended claim 1 does not expressly mention the features called species by the examiner in items 6-8 of the office action, claim 1 is nevertheless a generic claim with respect to all of these features because it is broad enough to encompass all of them; i.e., they are merely examples of specific embodiments falling within the scope of claim 1. See *Landis on Mechanics of Patent Claim Drafting*, § 6:9, “A generic claim is one that defines the element in question with sufficient breadth to cover all of the species claimed . . . while the species claims cover the separate embodiments . . .” The features identified by the examiner as species in items 6-8 of the office action are features that happen to

have been selected for mention in dependent claims. By the meaning of the word "comprising," embodiments of the invention of claim 1 may have many other features that do not happen to be mentioned in any of the claims. Applicants should not be required to elect certain embodiments from among all embodiments within a broad claim because the broad claim may not be allowed upon examination. A simple search request may be fashioned that will search all claimed embodiments. Applicants respectfully suggest that searching on Exxal-8 or Pluronic L81 or polymeric material or elastomeric material or bubbling vs. soaking or salt water vs. fresh water is not the way to get at the essence of the present invention. Applicants believe that the proper search strategy would be based on features specified in claim 1, as amended herein. Nevertheless, to comply with the election requirement, Applicants elect the following species: A, a, aa, iii, and Pluronic L81.

Applicants particularly disagree with the requirement to elect between specific chemical additives, Pluronic L81 for example. Applicants do not represent to have identified all wetting agents (makes smaller bubbles) or all bubble coalescence retardation additives (keeps the bubbles small) that can be used in the present invention. The examiner seems to imply in item 8 of the office action that it is necessary to restrict the invention to a single specific additive in order that the literature search may be simplified. Applicants expect that all examinations would be simplified if bottom-up searches could be done instead of top-down searches, i.e. if the restriction requirement could be repeatedly applied to dependent claims to force an applicant to discard every embodiment of his invention but one.

Regarding generic and species claims, it is noteworthy in the present context that the Landis treatise (§ 6:9) advises as follows; "Therefore, the practitioner should not be concerned about whether a claim is a generic or species claim. Just write the claims seeking the broadest scope of protection that the disclosed invention and the prior art will allow. Some claims should be broad enough to cover all species, if possible." This is what Applicants have done, particularly in the amended claim set.

Applicants interpret the examiner to be asking in item 9 of the office action for a listing of all claims reading on the elected embodiment, i.e. upon a method for

increasing the rise time of air bubbles emitted from a diffuser in water, restricted to elections A, a, aa, iii and Pluronic L81. In the amended claim set, claims 1, 5, 6-8, 10-13, 15 and 20 all read on the elected embodiment(s). Applicants are unclear, however, about whether this interpretation of item 9 ("a listing of all claims readable [on elected species]") is what the examiner intended. If Applicants' new generic claim (claim 1) is not allowed (and Applicants' traversal of the requirement to elect between apparatus and method claims is also not accepted), Applicants might then amend claim 1 back to the original claim 1 and cancel all other claims except claims 5-8, and even those would probably be amended to remove references to non-elected species. In fact, the elected limitations of claims 5 and 6 would probably be incorporated into claim 1, leaving only claims 7 and 8 as dependent claims. This speculation is offered in an attempt to be responsive to item 9.

Applicants have amended the reference number in claim 18 in compliance with the claim objection, item 1, in the office action.